

Application No. 10/636,142
Response to Office Action

Customer No. 01933

R E M A R K S

Reconsideration of this application, as amended, is respectfully requested.

ALLOWABLE SUBJECT MATTER

The Examiner's allowance of claims 7-9 is respectfully acknowledged.

THE CLAIMS

Claims 10 and 14 have been amended to clarify the feature of the present invention whereby the displacement sensor (which is provided between the stage and the objective lens) detects a displacement amount produced between the objective lens and the stage due to a change in ambient temperature.

In addition, claims 12 and 15 have been amended to clarify the feature of the present invention whereby a distance between the objective lens and the stage changes when the change in the ambient temperature causes thermal drift of at least one of the inverted microscope, the fixing base, the revolver, and the stage.

No new matter has been added, and it is respectfully requested that the amendments to claims 10, 12, 14 and 15 be approved and entered.

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THE PRIOR ART REJECTION

Claims 10-15 were rejected under 35 USC 103 as being obvious in view of one or more of US 2001/0024320 ("Okada"), USP 5,521,762 ("Tomiyama et al") and USP 6,437,343 ("Okazaki et al"). These rejections, however, are respectfully traversed with respect to claims 10-16 set forth hereinabove.

According to the present invention as recited in amended independent claims 10 and 14, a focus stabilizing apparatus is provided which comprises, in particular: an objective lens arranged underneath an observation sample so as to face the observation sample, a fixing base, a stage on which the observation sample is placed, a minute movement table to which the objective lens is fixed, and a displacement sensor provided between the stage and the objective lens to detect a displacement amount produced between the objective lens and the stage because of a change in ambient temperature.

That is, according to the present invention as recited in amended independent claims 10 and 14, the displacement sensor is provided between the stage and the objective lens and detects a displacement amount between the objective lens and the stage.

With this structure, loss of focus resulting from displacement of the objective lens with respect to the stage due to thermal drift (i.e. thermal expansion or contraction of the microscope body) caused by ambient temperature changes can be

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detected. And the control section/controller of the focus stabilizing apparatus can compensate for the displacement amount caused by the changes in ambient temperature.

By contrast, it is respectfully submitted that Okada merely discloses detecting vibration of the arm 3 using a vibration sensor 15, which may be a piezoelectric acceleration sensor and which is provided in the structure-side member 11 that is attached to the arm 3. According to Okada, the vibration sensor 15 outputs a vibration signal p, and a drive signal s for the piezoelectric actuator 13 is derived based on the vibration signal p. The piezoelectric actuator 13 vibrates the mass 20 (ocular tube 4, intermediate attachment 4 and CCD camera 6) to reduce the vibration of arm 3.

It is respectfully submitted, moreover, that even though the vibration sensor 15 of Okada detects that the arm 3 vibrates, and therefore that the objective 8 moves with respect to the stage, it does not follow that the sensor 15 of Okada detects a displacement amount produced between the objective lens and the stage because of a change in ambient temperature.

Therefore, it is respectfully submitted that Okada does not disclose, teach or suggest providing a displacement sensor between the stage and the objective lens for detecting a displacement amount produced between the objective lens and the stage due to a change in ambient temperature.

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In item 5 on pages 4 and 5 of the Office Action, the Examiner contends that it would have been obvious to replace the vibration detector 15 of Okada with the Z-displacement detector 204 and detector target 207 disclosed by Okazaki et al, so as "to provide highly accurate displacement measurements."

As explained hereinabove, however, it is respectfully submitted that Okada does not disclose, teach or even remotely suggest measuring a displacement amount between the objective lens and the stage.

It is respectfully submitted that Okada is clearly related to detecting an amount of vibration, and not a displacement amount between the objective lens and the stage.

And it is respectfully submitted, therefore, that it would not have been obvious to replace the vibration sensor 15 of Okada with a detector and target as disclosed by Okazaki et al.

In item 3 on page 3 of the Office Action, the Examiner takes "Official Notice" that inverted microscopes are well known and the Examiner asserts that it would have been obvious to make the microscope of Okada as an inverted microscope such that the objective lens thereof would be arranged underneath the observation sample so as to face the observation sample, as recited in amended independent claims 10 and 14.

It is respectfully pointed out, however, that the dynamic vibration absorber of Okada is provided to solve a problem

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experienced in a microscope that is obviously not inverted. Indeed, as explained in paragraph [0018] thereof, for example, Okada is directed to solving a problem experienced in a microscope in which the optical system is supported by a "cantilever-type frame."

And according to Okada, the objective lens is held above a sample by an arm 3. The vibration of the arm 3 causes the objective to vibrate with respect to the sample, thereby blurring a sample image. Therefore, the dynamic vibration damping system detects vibration of the arm 3 and compensates for the vibration using piezoelectric actuator 13 as explained hereinabove.

It is respectfully submitted that if Okada were converted into an inverted microscope in which the objective lens is arranged underneath an observation sample so as to face the observation sample (as recited in amended independent claims 10 and 14), then there would be no arm 3, and thus no need for a vibration sensor 15 to sense the vibration of the arm 3.

Tomiyama et al, moreover, has merely been cited for the disclosure of parallel springs.

In view of the foregoing, it is respectfully submitted that amended independent claims 10 and 14, as well as claims 11-13 and 15 respectively depending therefrom, all clearly patentably distinguish over Okada, Tomiyama et al and Okazaki et al, taken singly or in any combination under 35 USC 103.


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Entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,


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